Extensible Data Environment & Product Data Markup Language

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Extensible Data Environment

XDE Definition

A structured approach supported by consensus products that effect interoperability among tasks in an open network environment such that a continuous end-to-end process flow through the tasks is achieved for one or more business processes.

XDE Examples

* MS BizTalk
* RossettaNet
* Commerce.net
* Commerce One
* xml.org (OASIS)

XDE Elements

Specifications for inter-task messaging

Framework for integrating dissimilar but related data

Procedures for information assurance

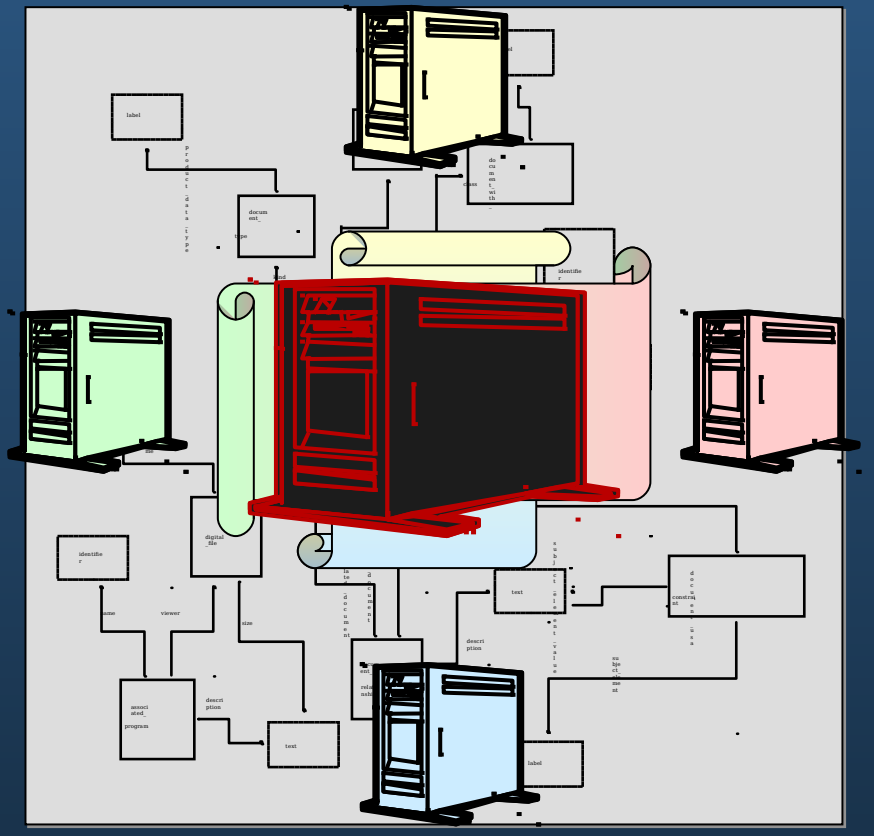
Products for interoperable workflow

Self-describing, WEB based language; X M L

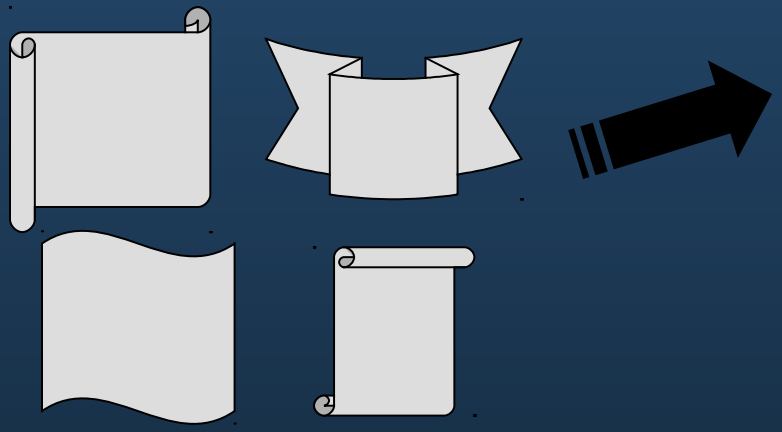
A Short History of Information Interoperability

Standard Systems

Standard Environments



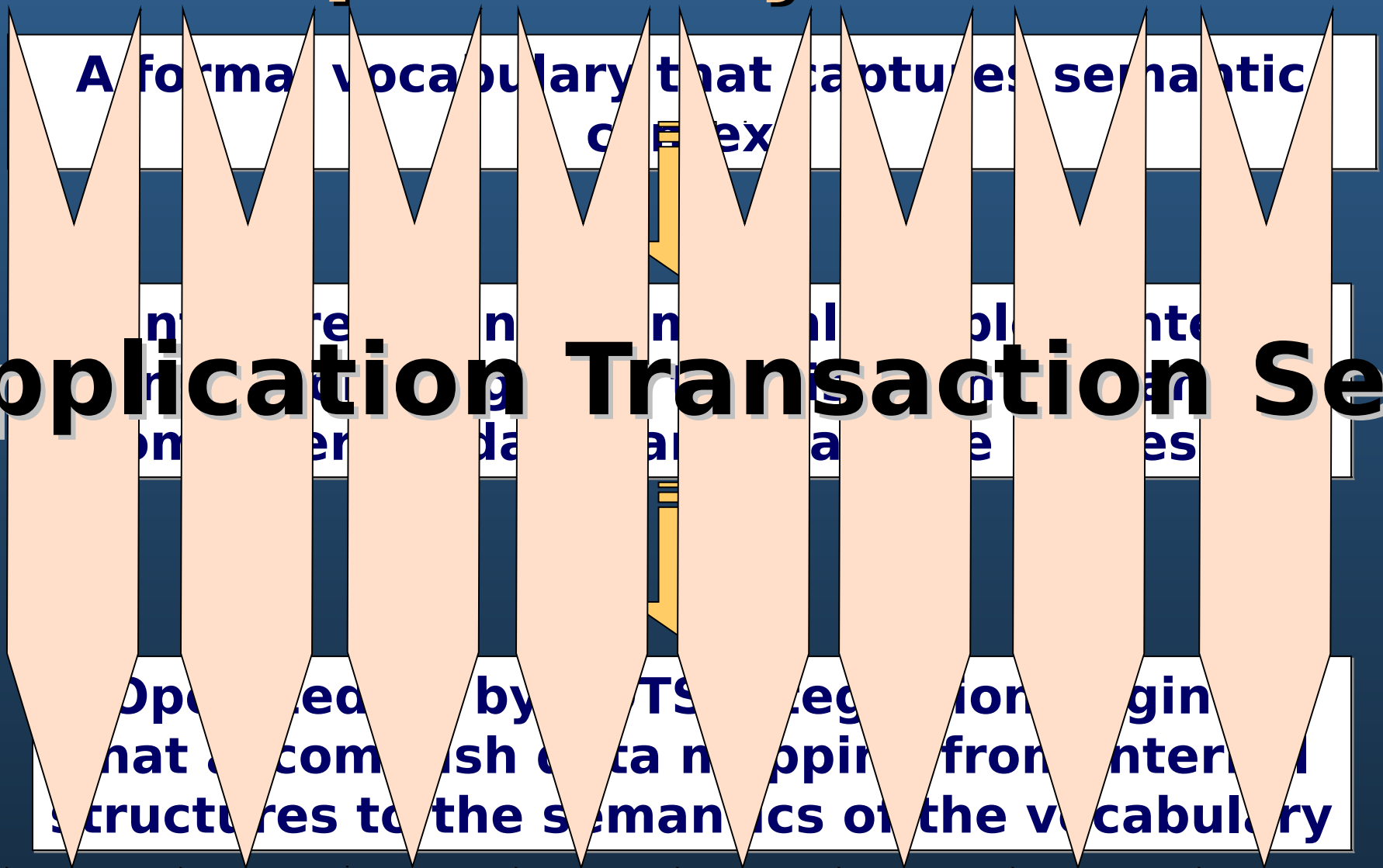
Data Standards



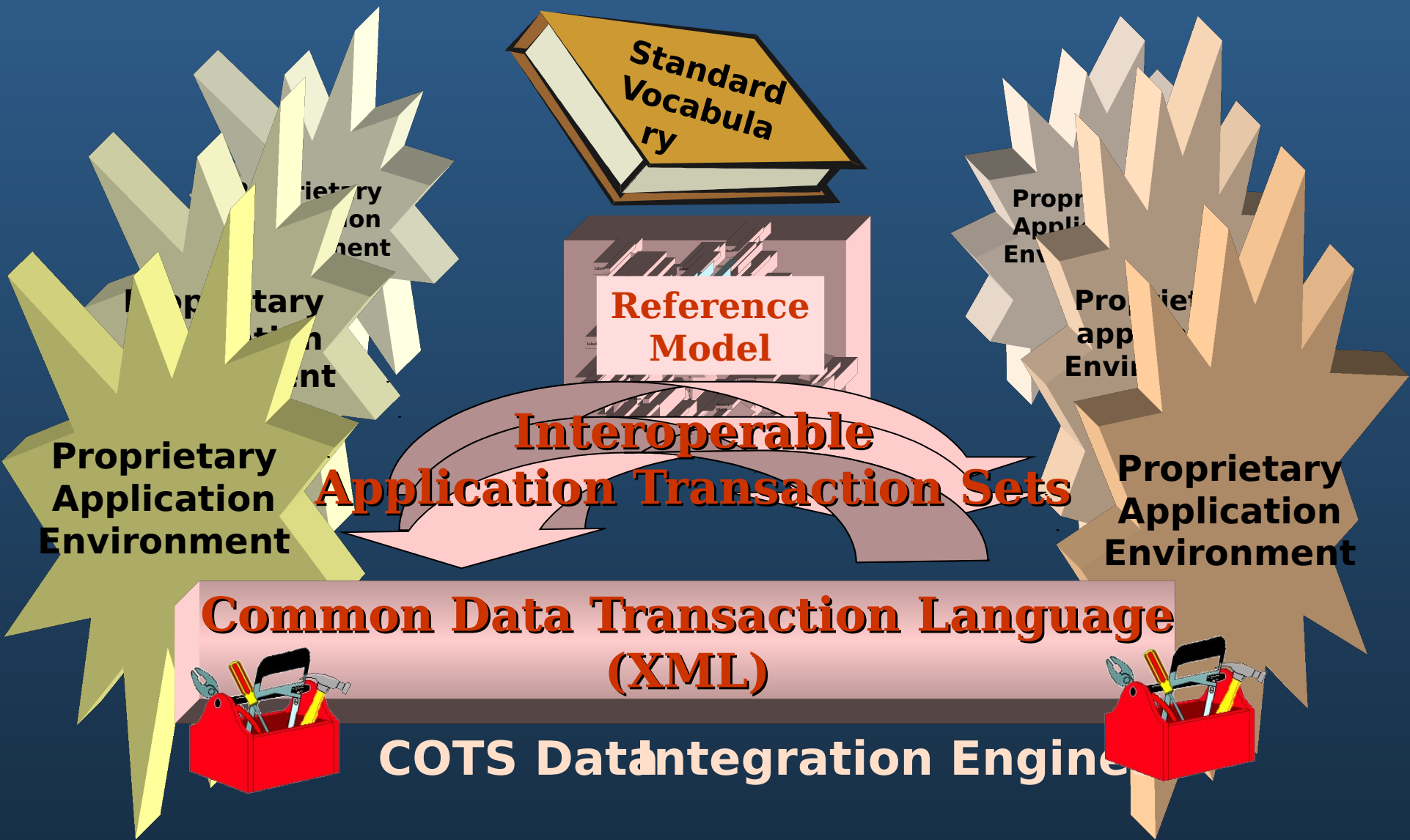
Data Standards Dilemma

- Current data standards
  - Multiple
  - Inconsistent
  - Overlapping
- No common data dictionary
- No common data naming convention
- No recognized semantic harmonization framework

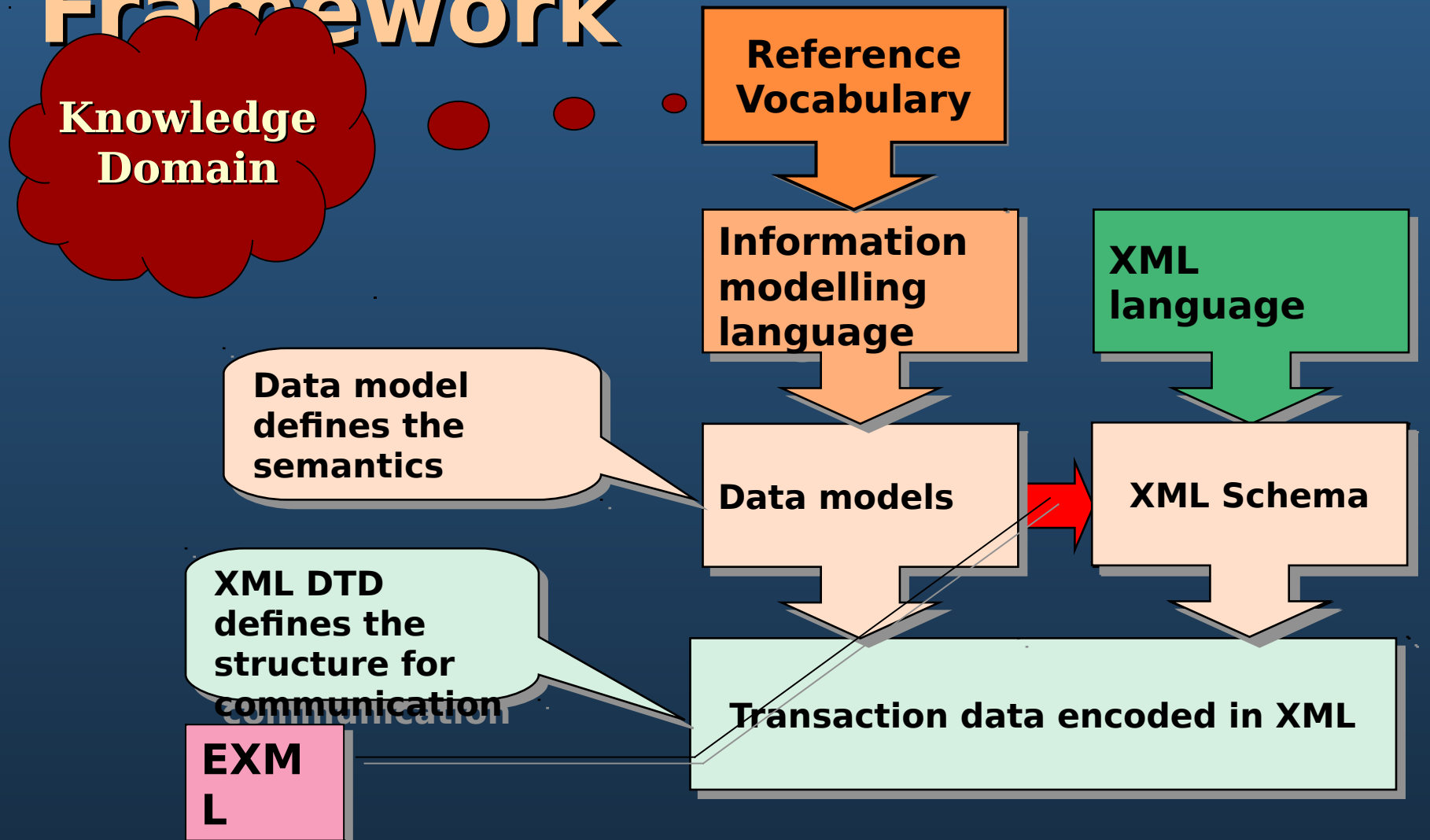
A Framework for Data Interoperability



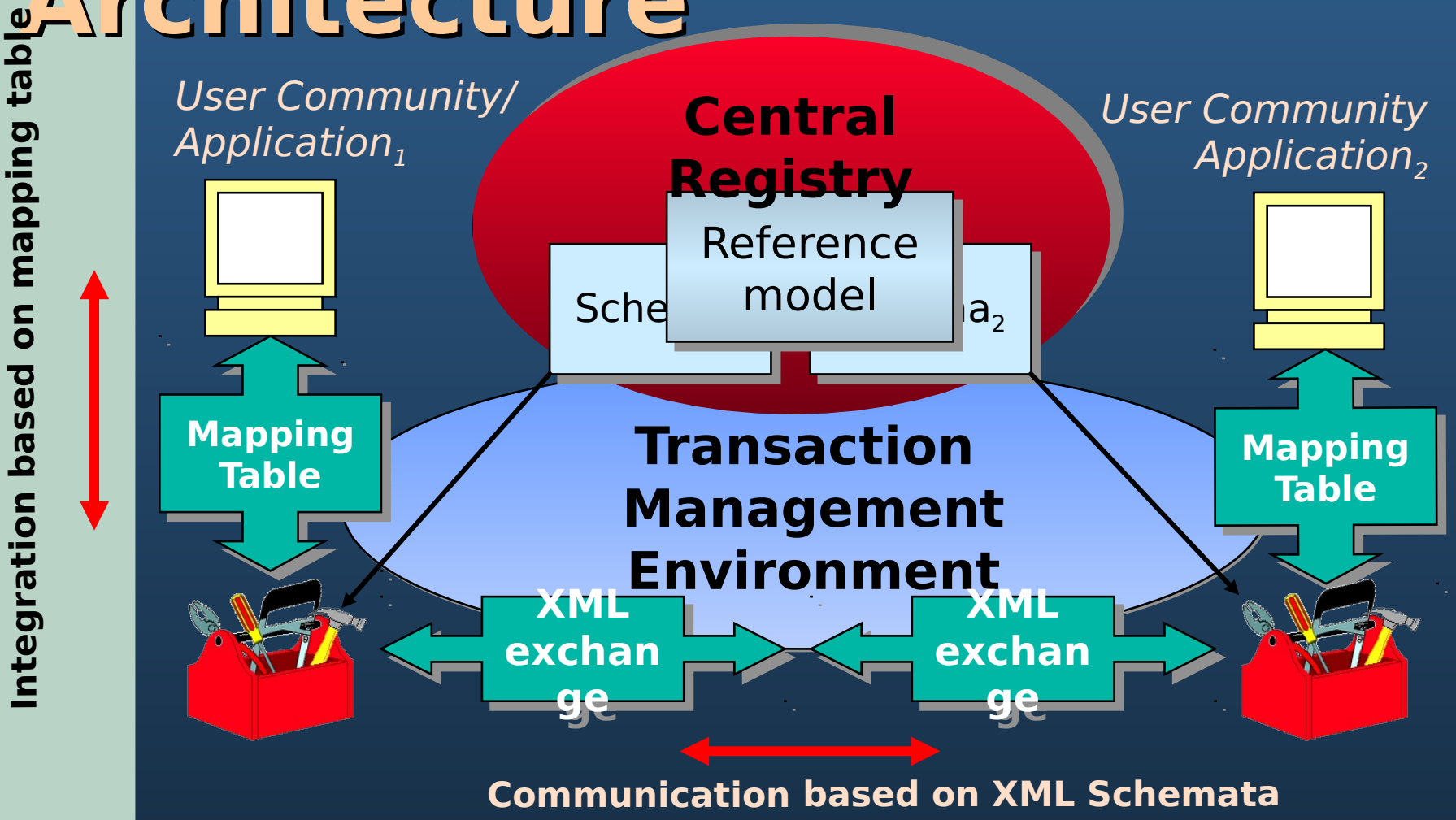
Applying the Framework



Semantic Harmonization Framework



Interoperability Framework Architecture



Commercial XDE Applications

Autonomous Integrated Data Environment

Legacy System Migration

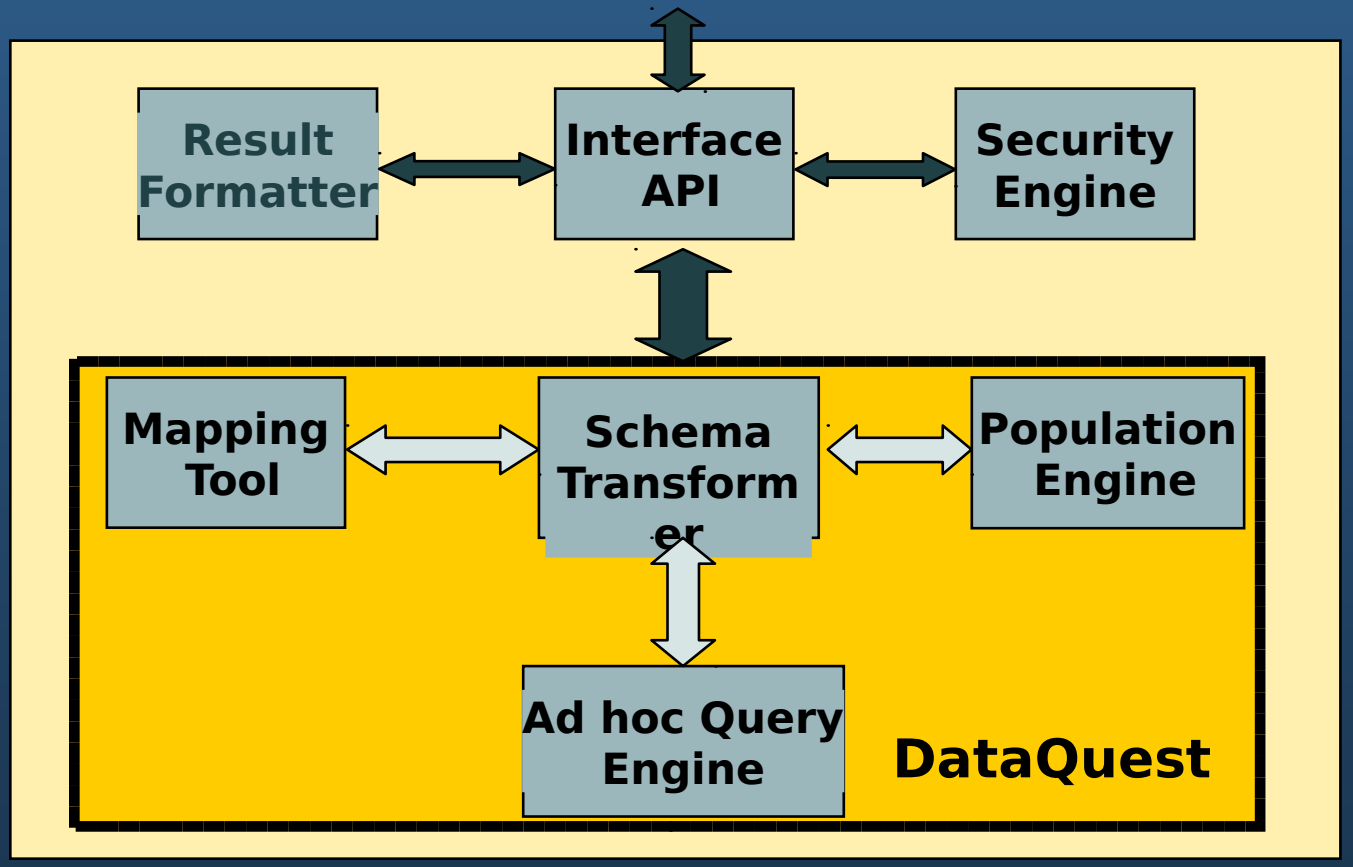
Framework as Middleware

ERP Integration

Legacy Data Integration

Shared Integrated Data Environment

One COTS Integration Tool



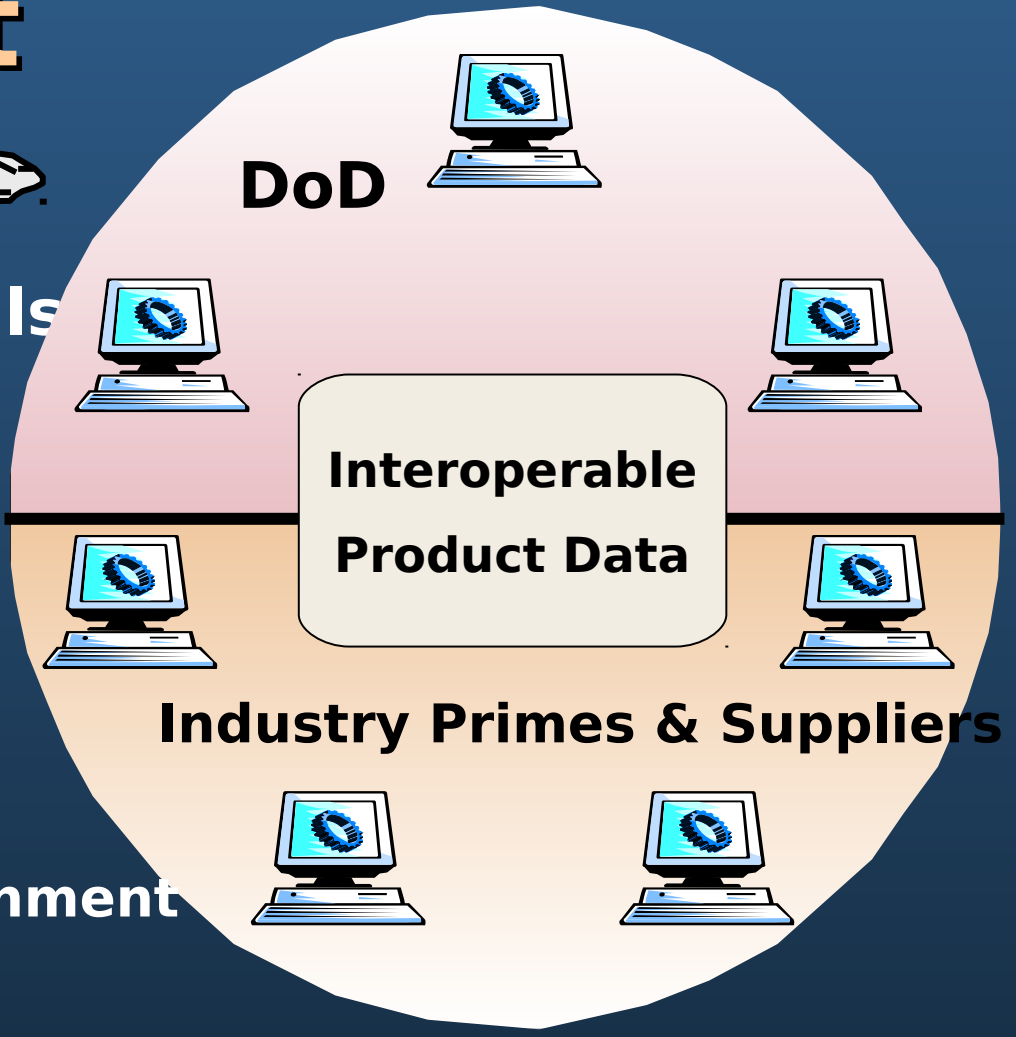
DataQuest Server COTS

Product Data Interoperability Requirement

Interoperability Goals

- transact product data
- locate product data
- reference product data
- relocate product data
- maintain copies of product data ...

In an open network environment

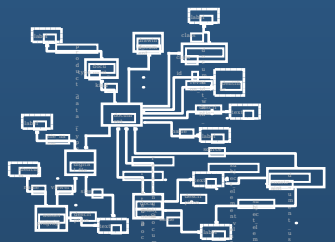


ATS Derivation for Product Data

Source Data

- Mil-Std 2549
- JEDMICS
- TechOrder-4
- PDM Sys
- PDM Enablers
- PDM Schema

PD Reference Model in EXPRESS

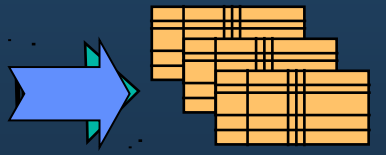


Mapping of Source Data to a Standard Vocabulary

	Source Data Name	Source Data Specification	Mapping Specification
1	*Part/Material design enterprise code (CODE)*	group.id	[(group_assignment on organization role.name = 'enterprise type code') (organization_assignment on product identification.role.name = 'designer')]
2	*Part/Material design enterprise identifier*	identification_assignment.id	[(identification_assignment on organization, organization => cage identification_role.name = ' cmo cage', ' gov cage') (organization_assignment on product organization_role.name = 'designer')]
3	*Part/Material Identifier*	product.id	product <=>material
4	*Material identification parameter list*	product.id	product <=>material
5	*Part/Material name*	product.name	
6	*NSN*	identification_assignment.id	identification_assignment on product identification .role.name = 'NSN'
7	*Product tracking-lead source code (CODE)*	group.name	group_assignment on product group .role.name = 'tracking base source code' [group.name = 'D', 'drawing', 'C', 'configuration item', 'U', 'Specification', 'S', ' standard document', 'P', 'product', 'M', 'material']
8	*Product tracking base identifier*	group.id	group_assignment on product group .role.name = 'tracking base source code'
9	*Defining document identifier and type code*	[document.id] [document_kind.name]	product_definition with associated document.documents [i] -> document or drawing document
10	*can be substituted for/replaces part/material source, or has company stock number assigned by*	organization.id	[is the org that has organization_assignment on the product that is the related_product_definition in product_definition_relationship where the relationship.name = 'substitute'
11	*can be substituted for/replaces part/material identifier, or is company stock number of*	product.id	[is the related_product_definition in product_definition_relationship where the relationship.name = 'substitute'
12	*can be substituted for/replaces part/material identification parameter list*	product.id	[is the product <=>material identification related_product_definition in product_definition_relationship where the relationship.name = 'substitute'

Application Transaction Set Abstractions in EXPRESS

PDML Application Transaction Sets_

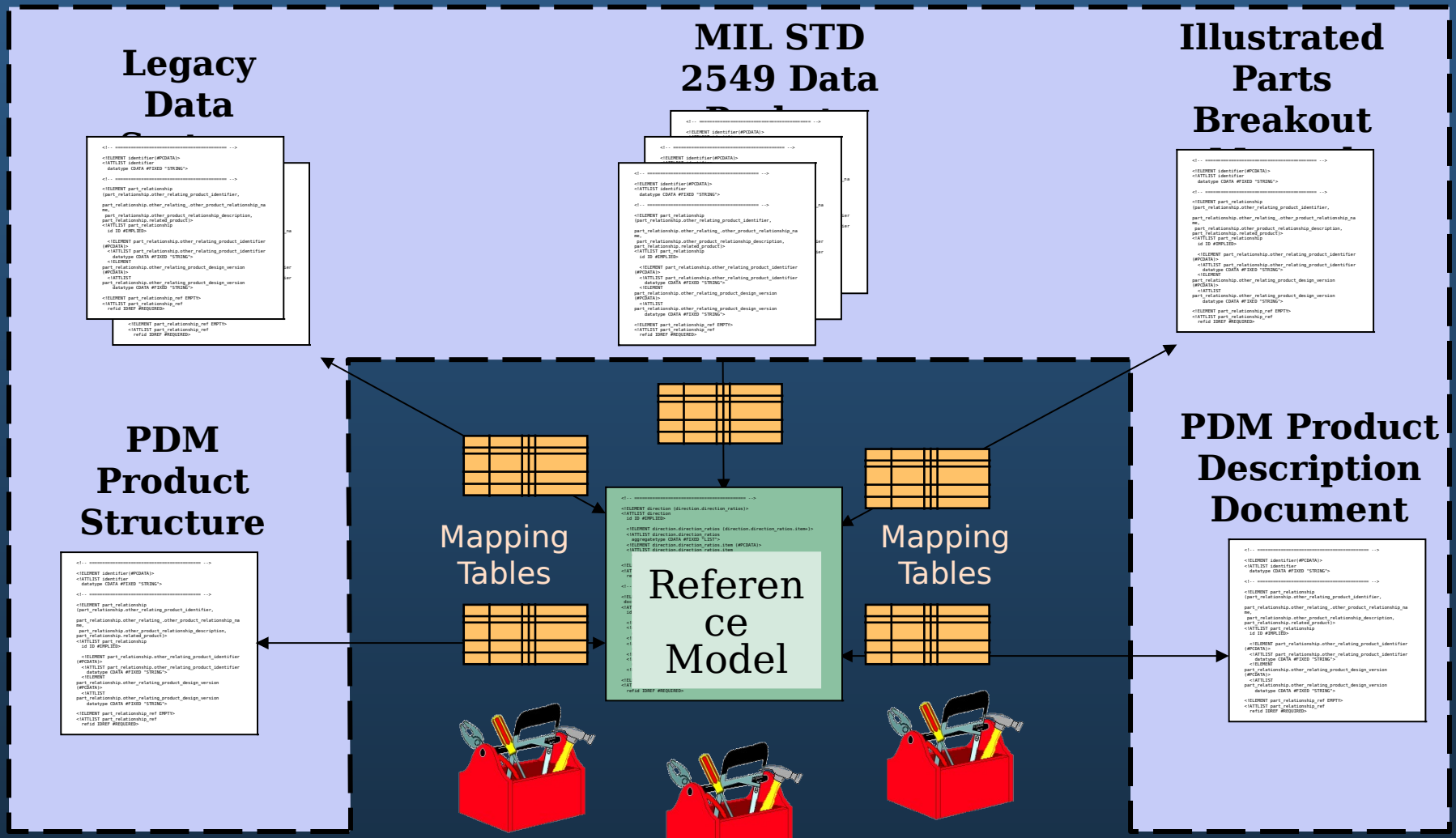


Analysis → Auto Tools

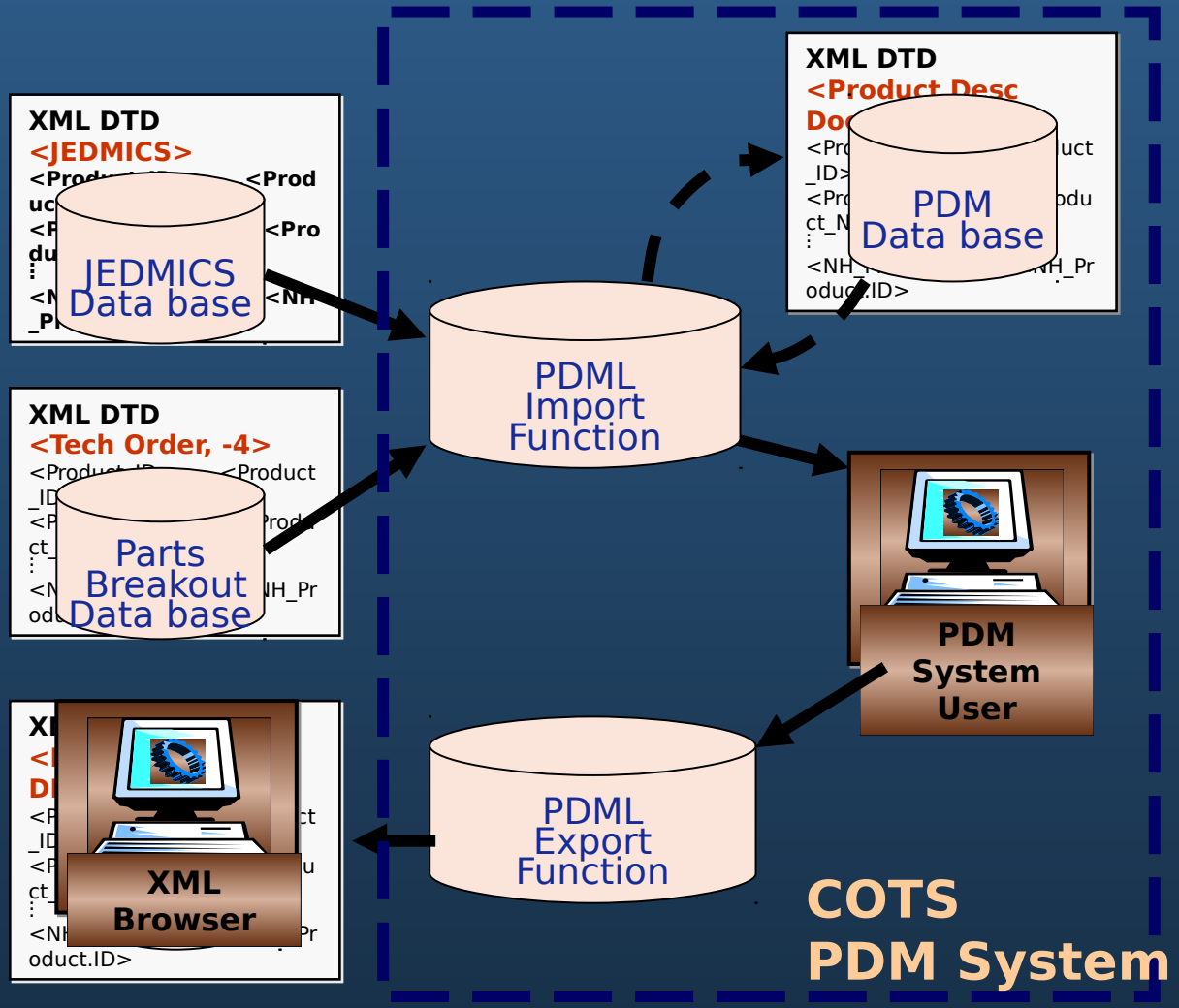
XML Schemata

Mapping Tables

Product Data Interoperability Example



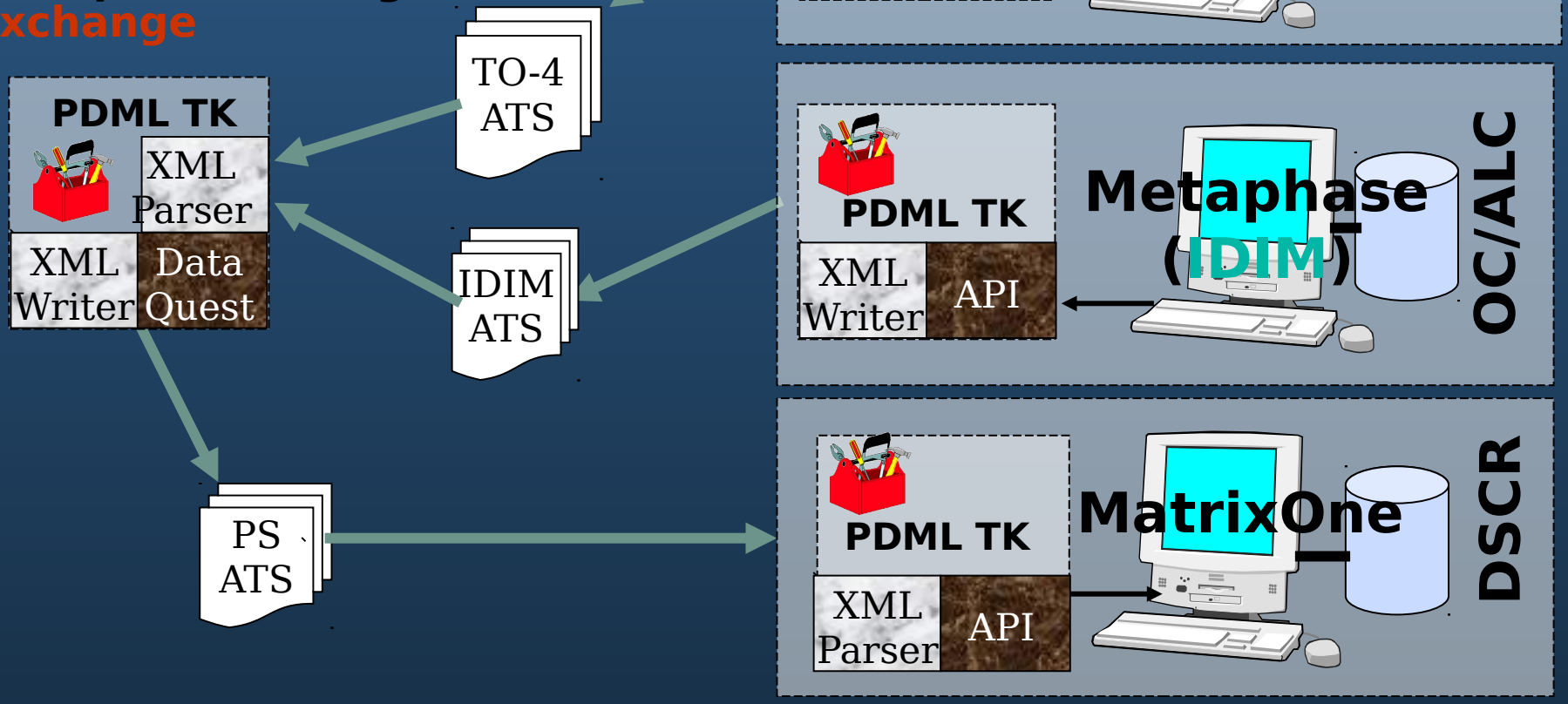
PDML Laboratory Demonstration



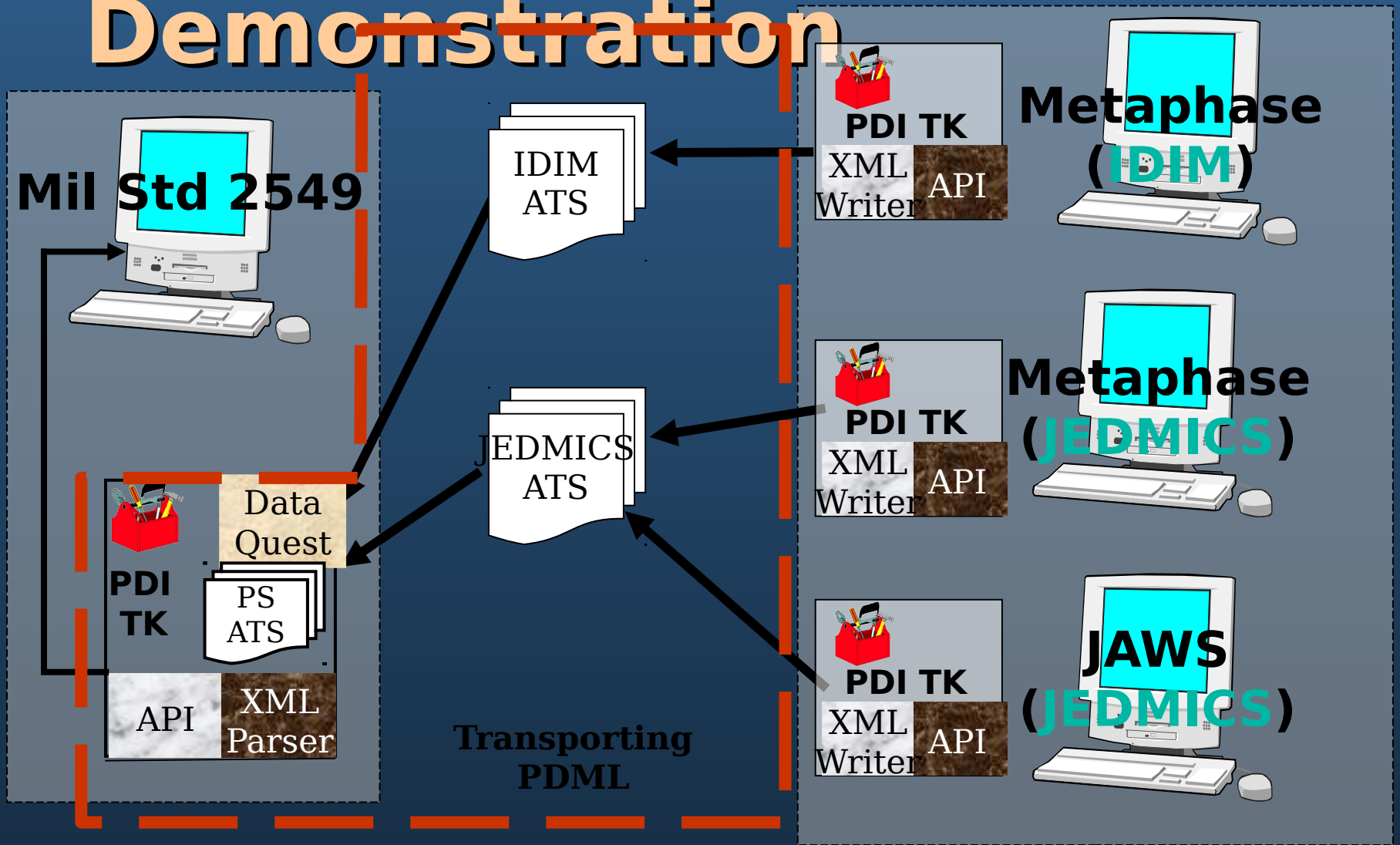
PDM System Integration Demonstration

OC/ALC SPO & ESA

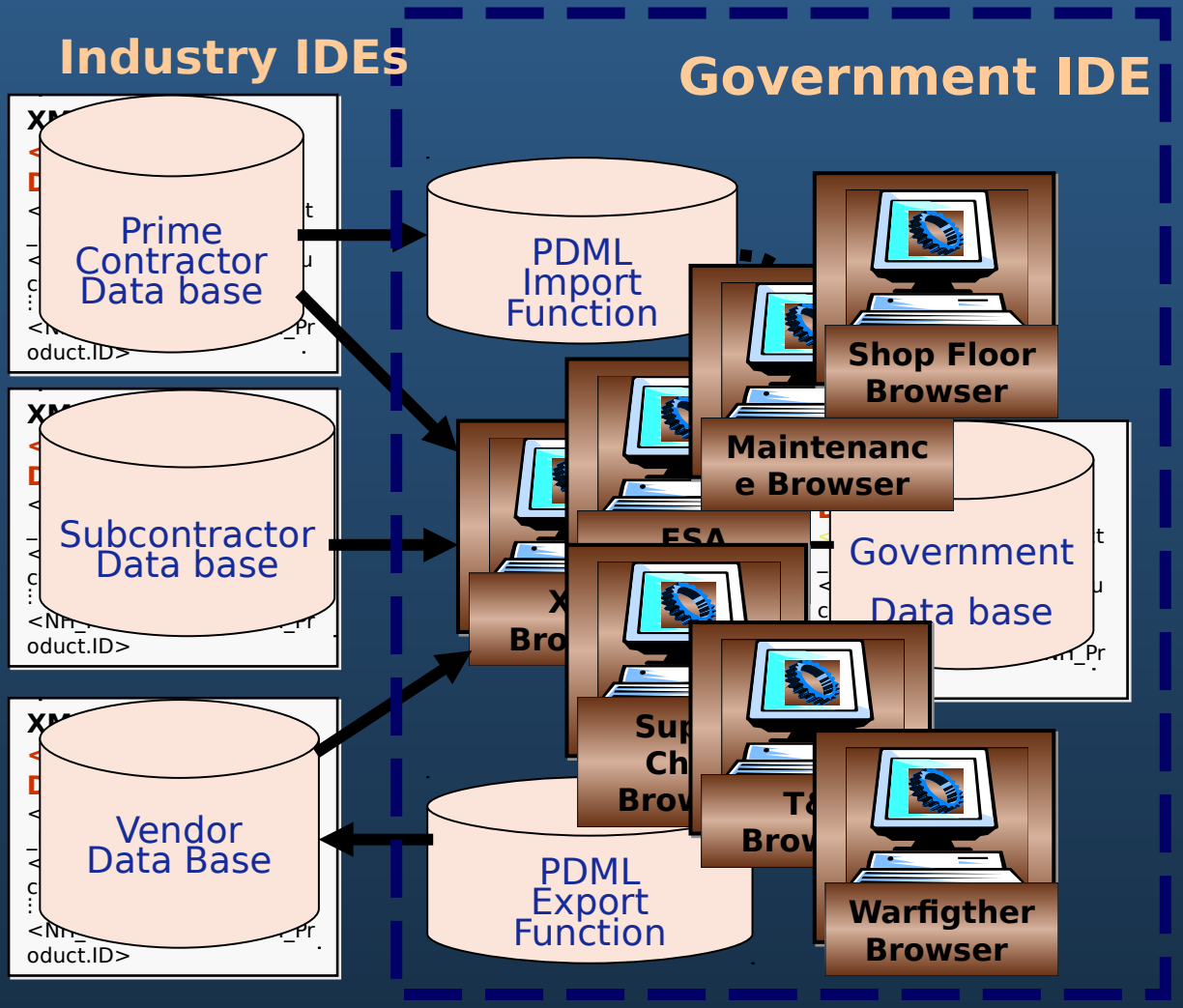
- **Integrate Product Data**
- **Incorporate change & Exchange**



PDML Legacy Data Integration Demonstration



PDML End State Enterprise CITIS



Pilot Project Objectives

- Develop a prototype to capability demonstrate PDML

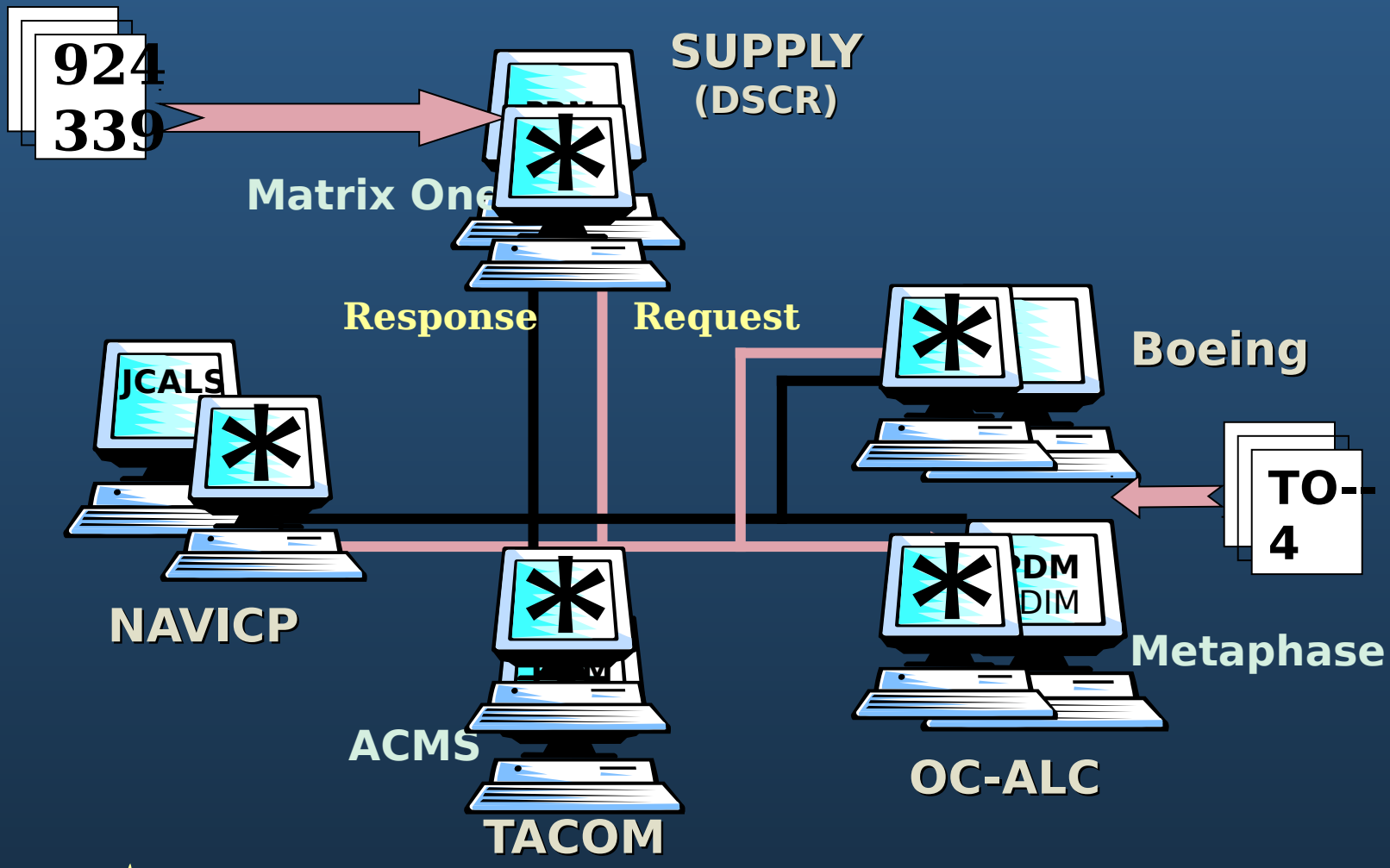
- Provide components for vendor PDML implementations to minimize their effort.

- Leverage XML and Internet technologies by providing user-friendly facilities for product data transaction management.

PDML Pilot Projects

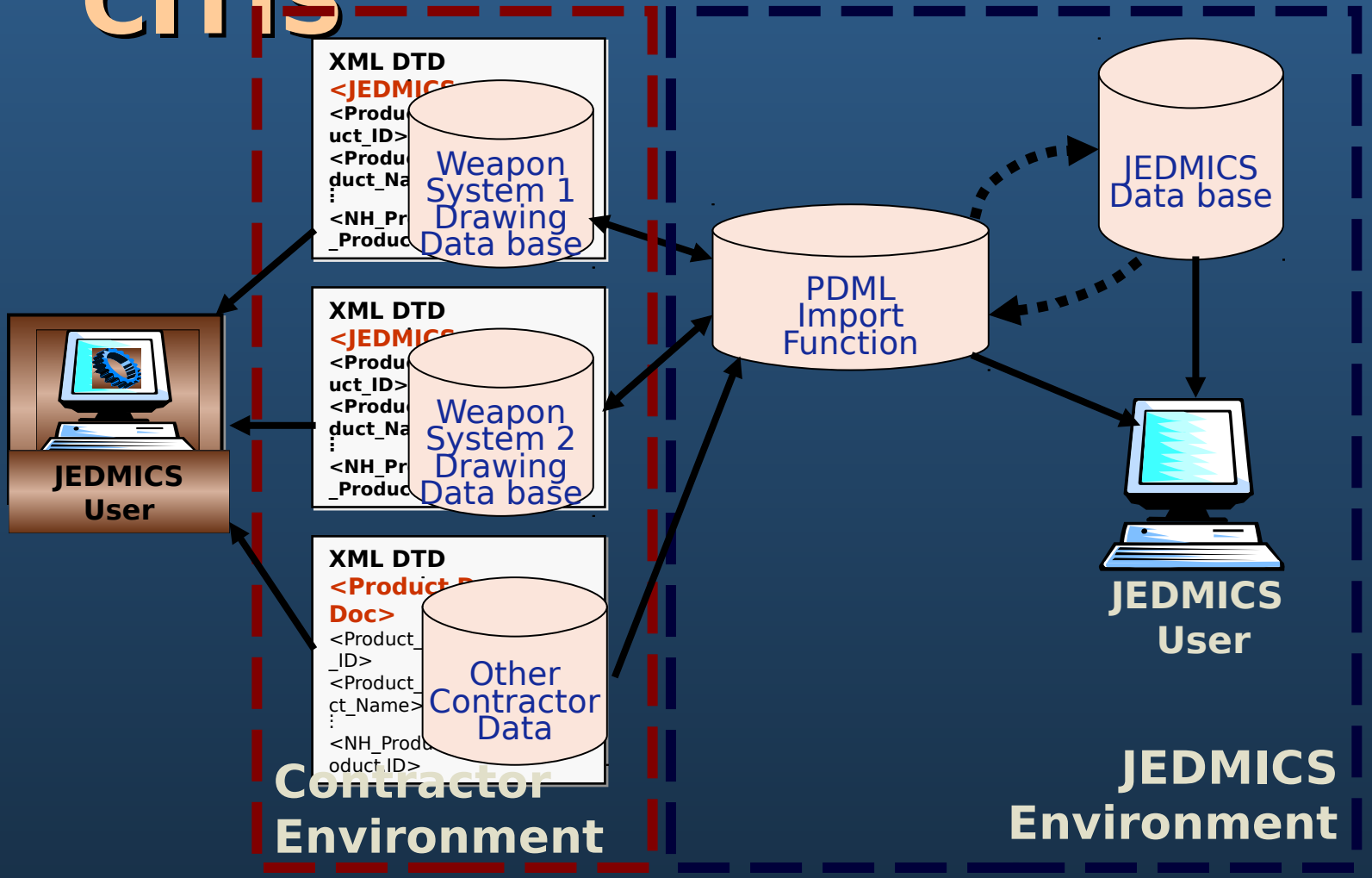
- Interconnect Defense Supply Centers with Service's inventory & Engineering Centers through PDM interoperability to achieve paperless process flows
  - Technical Data Package assembly
  - Request for engineering services
  - Reduce redundant data management
- Use PDML to facilitate product data delivery/access for legacy weapon system programs (Legacy CITIS)
- Use PDML and Mil-Std-2549 based Application Transaction Sets to achieve an Enterprise CITIS capability
- Evaluate alternative middleware solutions for web based transaction management

PDML Pilot Project -- FY 00



✶XML based EC transaction

PDML Pilot Project -- FY 01 Virtual JEDMICS/Legacy CITIS



PDML Findings

- Small, concrete, local domain data models
  - Semantically complete and unambiguous
  - Adaptable to local requirements
  - Mappable to abstract model
- Abstract model
  - Standardizable - more stable over time
  - Integrated - consistent view of concrete models
- Integration through consistent data mapping
  - Common reference model
  - Rule based context mapping
  - Scalability through interpretation
- Solution:
  - Structured Suite of XML Vocabularies

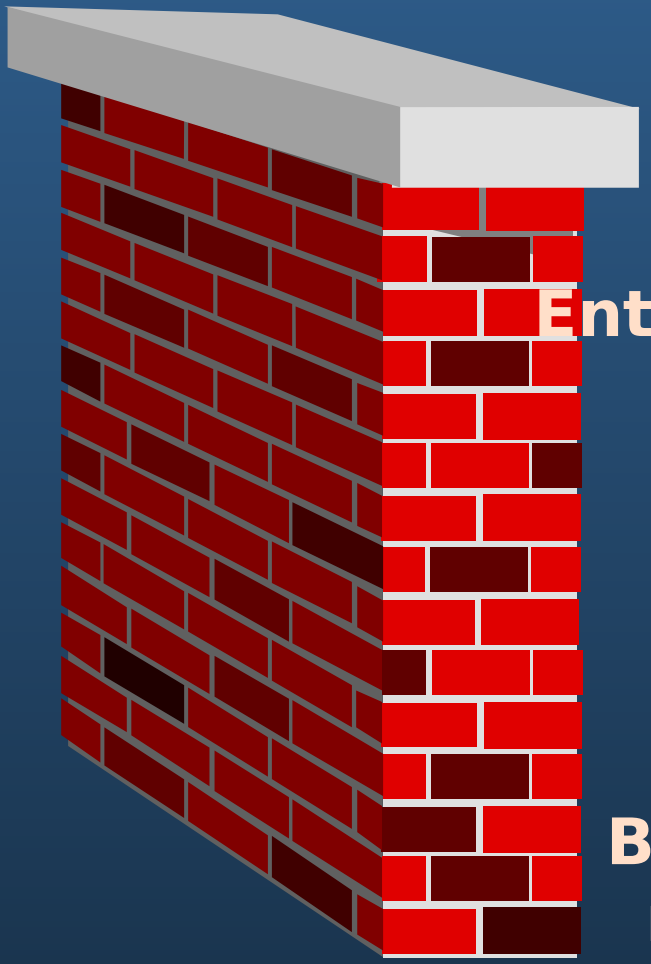
A Defense Extensible Data Environment

A framework for building IDEs, specifically:

- Modeling the content and context of defense data
- Integrating data from different contexts
- Migrating legacy environments

- Providing consensus data structures to industry for common interfaces to DoD
- Extending data structures to new processes and applications

The Legacy Data/System Wall



Enterprise integratio

Business system modernization

The Need for a Defense XDE

- The XDE framework represents a unique opportunity for DoD to take ownership of its data
- Considerable industry movement along many fronts is evidence of framework concept as emerging best practice

Will not happen on a system by system basis

Need to build the framework as well as specific

The DoD Data Standardization Program is the reference point

Defense XDE Approach

1. Accelerate PDML as proving ground for XDE

2. Form alliance between DoD functional process owners and industry associations/consortia

3. Develop appropriate organizational and management structure from existing entities

4. Develop reference models and application transaction sets for DoD domains of knowledge

5. Migrate resulting XDE to legacy applications on case by case basis

6. Need for XDE application driven by business system modernization or process improvement projects undertaken by functional owners

7. Establish DoD schema registry/repository with industry back up

8. Program appropriate level of effort

Potential Defense Knowledge Domains

Logistics

- Product data
- Change management
- Inventory management
- Supply chain management
- Maintenance, repair, overhaul
- Transportation
- Facilities
- Fuels
- Subsistence
- Ammunition

Acquisition

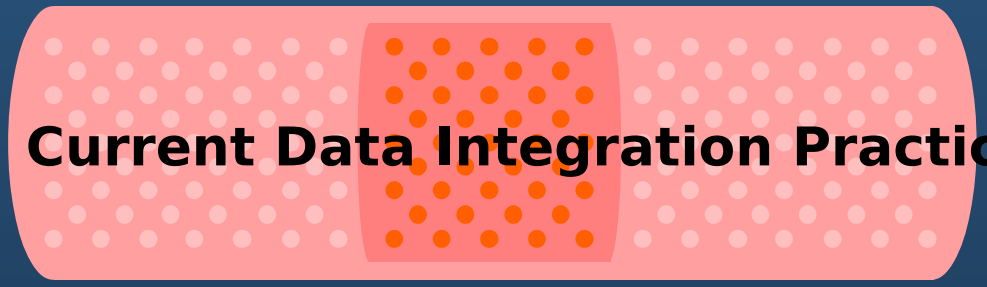
- Product data
- Change management
- Provisioning
- Logistics planning
- Test & evaluation
- Requirements generation
- Program planning & reporting

Personnel

- History
- Medical

Why DXDE and Why Now

- Rapidly emerging industry best practice with potential of dramatically reducing data integration time and effort
- DoD is facing several major legacy data integration problems up to and including GCSS
- There is an industry track record indicating that current practices won't cut it



- DoD's unique data requirements need to be addressed in a comprehensive fashion
- To some degree, organizational structures and working relationships are in place, coordination needed
- Need strong participation from defense industry, leadership from DoD

Recommendations

- Release FY 00 JECPO funding; support FY 01 programming for PDML
- Initiate actions to build the framework for GIG/IDE/GCSS. Address:
  - Applicability
  - Architecture
  - Information domains
  - Repository and other issues
  - Plan of action and milestones
- Plan to establish a major joint Service/Industry initiative to populate the framework in four years
  - Staffing
  - Organization
  - Cost Model

Conclusion: Need for a DXDE

- PDML is example of XML-based extensible data environment (XDE)
  - Framework approach achieves extensible interoperability
    - Framework provides semantic harmonization methodology
      - Framework requires reference dictionary
        - Framework requires schema registration services(s)
          - Framework focuses hard work needed to manage defense data; doesn't eliminate it
- Framework worthy of further consideration

Backup Charts

Commercial Applications

- PDM installation
  - Provides reference schema templates
- PDM to PDM integration
  - Provides data exchange methodology
  - Provides common data mappings
  - Provides data exchange infrastructure
- PDM to ERP integration
  - Provides methodology for formalizing common data elements/schema
- PDM.com
  - Web based marketplace of PDM services
  - Provides basic transaction service templates
  - Provides in WEB based language (XML)